GCSE MARKING SCHEME

SUMMER 2025

GCSE
DOUBLE AWARD SCIENCE
BIOLOGY 2 - UNIT 4
3430U40-1 AND 3430UD0-1

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About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

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DOUBLE AWARD SCIENCE
UNIT 4 BIOLOGY 2

SUMMER 2025 MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks
Examiners must mark in red ink.
One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).
Question totals should be written in the box at the end of the question.
Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules
All work should be seen to have been marked.
Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.
Crossed out responses not replaced should be marked.
Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question
A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations
The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao	=	correct answer only
ecf	=	error carried forward
bod	=	benefit of doubt

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		Eyes	1			1		
		(ii)		Ears	1			1		
		(iii)		Tongue / nose	1			1		
	(b)			Receptor (1) Central (1) Electrical (1) Brain (1)	4			4		
				Question 1 total	**7**	**0**	**0**	**7**	**0**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			False False True True 4 correct for 3 marks 3 correct for 2 marks 2 correct for 1 mark 0/1 correct for 0 mark	3			3		
	(b)	(i)		Clones	1			1		
		(ii)		Mitosis	1			1		
				Question 2 total	**5**	**0**	**0**	**5**	**0**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		**Any one (x1) from** (Two) layers of feathers (to trap air) (1) Thick layer of fat (1) Ignore waterproof		1		1		
		(ii)		**Any one (x1) from** Webbed toes (1) Waterproof outer layer (of feathers) / waterproof feathers (1) Thick layer of fat (1) Flippers (1)		1		1		
	(b)	(i)		Animal	1			1		
		(ii)		Has a backbone	1			1		
				Question 3 total	**2**	**2**	**0**	**4**	**0**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			**Any two (x1) from** • If they {eat / kill} (Greyback) {cane / the} beetles (1) • If they eat other species / damage other species / damage sugar cane plants / only target the pest species (1) • Do they have any predators (1) • Do they carry disease (1) • Can they reproduce (in the new habitat) / how fast they reproduce / how many times a year they reproduce (1) • Can they survive in the new {habitat / environment / climate} (1)		2		2		
	(b)			**Any two (x1) from**: • No predator (1) • Eat a wider range of food (1) • Reproduce more often (1) • Lay more eggs (1) • poisonous if eaten (1) • Accept reverse argument for all points above • Cane toads eat (Australian) frogs (1)			2	2		
				Question 4 total	**0**	**2**	**2**	**4**	**0**	**0**

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Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
5	**Indicative content:** A. Wash hands (often) / sanitize hands B. Cough into elbow C. Avoid touching face D. Keep (1 m) apart / keep your distance / distancing E. Wear a mask F. (Wash hands) to {remove / kill / wash off} {virus / bacteria} G. (Cough into elbow / wear mask / keep distance) to stop spread by {aerosol / in the air} / stop it being air borne / stop breathing it {in / out}. H. (Avoid touching face) to avoid transferring {virus / bacteria} to yourself I. (Wash hands / Cough into elbow / avoid touching face / keep distance) to reduce risk of (person to person) transfer by contact **5-6 marks** At least 7 points from indicative content *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3-4 marks** At least 4 points from indicative content *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.* **1-2 marks** At least 1 point from indicative content *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks:** *No attempt made or no response worthy of credit.*		6		6		
	Question 5 total	**0**	**6**	**0**	**6**	**0**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			To avoid <u>bias</u>	1			1		1
	(b)	(i)	I	5 = 2 marks **If incorrect award 1 mark for** 50/10		2		2	2	2
			II	625		1		1	1	1
			III	3125 Ecf from I and II		1		1	1	1
		(ii)		Banded snails are (better) {camouflaged / or description of} / less likely to be {eaten / seen by predators} / ORA e.g. unbanded snails are easily seen by predators Ignore: easier to see unqualified / any reference to reproduction			1	1		1
		(iii)		**Any one (x1) from** Increase the sample area (1) Use more quadrats (1) Repeat the experiment (1) Compare with another groups (1) Reject other locations			1	1		1
	(c)	(i)		All 4 plots correct = 2 marks 2/3 plots correct =1mark Tolerance = < one small square		2		2	2	2
		(ii)		there were {more birds to eat them / more predators}			1	1		1

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		**Any two (x1) from** sample area / same field / same area of land / same location (1) time of year (1) time of day (1) weather / owtte (1)			2	2		2
				Question 6 total	**1**	**6**	**5**	**12**	**6**	**12**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			X - The pancreas releases insulin (1) Y - Glucose is converted to <u>glycogen</u> (1) Ignore liver		2		2		
	(b)	(i)		**Any two (x1) from** **(Volunteer A)** • levels {rise higher / rise very high / are very high / higher than normal range} (1) • levels rise {quicker / very fast / rapidly} (1) • levels do not return to {normal / 130(au)} (but B does) (1) • remains high(er for longer) / or description of / decreases more slowly (1) Ignore take longer to return to normal			2	2		
		(ii)		Blue (1) to green / yellow / orange / (brick) red (1)	2			2		2
		(iii)		**Any one (x1) from** • (Regularly) injecting insulin/ insulin {pump/ pen} • {Low/ reduced} {sugar / carbohydrate} diet • Transplant of pancreatic tissue • Metformin/ Ozempic / semaglutide / mounjaro / tirzepatide Regular exercise	1			1		
				Question 7 total	**3**	**2**	**2**	**7**		**2**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
8/1	(a)			Milvus		1		1		
	(b)	(i)		{Permanent loss / owtte} of a {species / red kite / Milvus milvus}	1			1		
		(ii)		**Any one (x1) from:** Provides (potential) food (1) Industrial materials (1) (New) medicines (1) Human well-being (1) Maintain biodiversity / prevents extinction (1) Ref to the effect on food chains (1)	1			1		
		(iii)		**Any two (x1) from:** • CITES / description of legislation / banning {hunting / poaching} (1) • SSSI / conservation areas / protected area / nature reserve (1) • {Sperm / seed} banks (1) • (Captive) breeding programmes (1) Ignore zoos • National parks (1) • Local biodiversity action plans (1)	2			2		
		(iv)		69900 = 2 marks **If incorrect award 1 mark for** $\frac{2100 - 3}{3} \times 100$		2		2	2	

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(v)		**Any two (x1) from:** • (increased population so) {(Increased) competition for / not enough} food (1) • (increased population so) {(Increased) competition for / not enough} {nesting sites / places to breed} (1) • Conservation efforts stopped (1) • Habitat loss / deforestation (1) • Disease (1) • Pollution (1) • Hunting(1)		2		2		
				Question 8/1 total	**4**	**5**	**0**	**9**	**2**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
9/2	(a)	(i)		185		1		1	1	1
		(ii)		**(The evidence supports the hypothesis because)** **Any one (x1) from** • {one teacher / Mrs Williams} has {{lower / faster} (reaction) time / faster reaction} than {all / the} students (1) • {Mrs Williams / one teacher} {{had the fastest (reaction) time / reaction} / was the fastest / was faster than the students} (1) **(The evidence does not support the hypothesis because)** **Any one (x1) from** • {Mrs Davies and Mr Jones / two / {the other} teachers} {(reaction) times are higher / reactions are slower} than {all / the} students (1) • {Mrs Davies / one teacher} {had the slowest {(reaction) time/ reaction} / was the slowest} (1) • Students have a lower mean time than the teachers / ORA (1) Ecf from (i)			2	2		2

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		**Any one (X1) from:** Height ruler was dropped (above hand) / owtte (1) Level of concentration / no distractions (1) Handedness (1) Eyesight (1) Age of teacher (1) Distance between thumb and finger (1) Caffeine / energy drinks / owtte (1) Ref males / females / gender (1) Time of day (1) Light levels (1)			1	1		1
	(b)	(i)		{Longer / slow(er)}(reaction) time / {lower / decreased} speed} / slows them down / it slows down / it is longer	1			1		1
		(ii)		{Liver / circulatory / heart} disease / brain damage	1			1		1
				Question 9/2 total	**2**	**1**	**3**	**6**	**1**	**6**

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<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks Available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td></td><td>(Animals that) do not have a backbone</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>305 = 2 marks
If incorrect award 1 mark for
61 x 70
14</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>1.64864865 / any correctly rounded answer / 1 (cannot have a fraction of an organism) = 2 marks
If incorrect award 1 mark for

305/185
Correct answer but Incorrect rounding
Ecf from (i)</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td><table><tr><th>Inaccuracy</th><th>Improvement</th></tr><tr><td>(Only) counted for 10 minutes</td><td>Count for longer (to gain a more representative sample)</td></tr><tr><td>Marking technique may make woodlice more noticeable</td><td>Use UV paint / example of alternative marking technique</td></tr><tr><td>(Only) left for 30 minutes / not left for long before collecting second sample / owtte</td><td>Allow longer before taking second sample (so marked individuals have time to mix with the rest of the population)</td></tr></table>Any inaccuracy (1) and linked improvement (1)</td><td></td><td>1</td><td>1</td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 3 total</td><td>1</td><td>5</td><td>1</td><td>7</td><td>4</td><td>6</td></tr>
</table>

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<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks Available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>4</td><td>(a)</td><td></td><td>I</td><td>Always {expressed / shown} / owtte</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>II</td><td>{(Alternative) form / version / variation / type} of {a gene / the same gene}
Reject different types of {genes/ gene}</td><td>1</td><td></td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>If it was {recessive / not dominant} {affected parents could not have an unaffected child / all children of affected parents would have it / 1 and 2 could not have 4 / 4 would be affected / 4 could not be unaffected}
Ignore reference to siblings / Punnett squares / ratios / probability</td><td></td><td></td><td>1</td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>Parent genotype Hh x hh (1)

Gametes H h x h h (1)

Mechanics of Punnett square (1)

<table><tr><td>Gametes</td><td>H</td><td>h</td></tr><tr><td>h</td><td>Hh</td><td>hh</td></tr><tr><td>h</td><td>Hh</td><td>hh</td></tr></table>Ecf from genotypes for Punnett square
Genotypes in Punnett square = 0</td><td></td><td>3</td><td></td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td></td><td>DNA is cut into {short pieces / small pieces / fragments / short sections} (1)
which are then separated {into bands / by size} (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td>2</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 4 total</td><td>4</td><td>3</td><td>1</td><td>8</td><td>0</td><td>2</td></tr>
</table>

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			**Indicative content:** A. {Blood {glucose / sugar} (level)} rises / it rises B. (Reaches a peak) {of {6.8-7.0} (mmol/dm^3) / at (approximately) {47.5-52.5} minutes} C. Then lowers to same level as before meal / returns to {normal / 4} (mmol/dm^3) D. Pancreas E. releases insulin F. Into the blood G. Glucose {converted to / stored as} <u>glycogen</u> H. in the liver I. negative feedback / homeostasis **5-6 marks** At least 7 points from indicative content *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3-4 marks** At least 4 points from indicative content *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.* **1-2 marks** At least 1 point from indicative content *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks:** *No attempt made or no response worthy of credit.*	4	2		6		

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)			Increase in blood glucose above normal range and not returning to 4			1	1	1	
	(c)	(i)		**Any two (x1) from** Both increasing / {cases / numbers} are increasing in both (1) (Percentage of adults in) Wales is higher (than in England) / England is lower (than Wales) (1) Difference remains stable throughout / difference is always between 0.6-0.9 (accept any value between 0.6 and 0.9) (1)			2	2		
		(ii)		Yes – (rate of) increase has slowed No – it is still increasing No conclusion – not enough data No mark for judgement unqualified			1	1		
		(iii)		Link between <u>type 2</u> diabetes and obesity		1		1		
		(iv)		**Any two for 1 mark** • (Regularly) injecting insulin / insulin {pump / pen} • {Low / reduced} {sugar / carbohydrate} diet • Transplant of pancreatic tissue • Metformin / ozempic / semaglutide / mounjaro / tirzepatide • Regular exercise	1			1		
				Question 5 total	**5**	**3**	**4**	**12**	**1**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		TAG ACC ATC TGG All Correct = 1 mark	1			1		
		(ii)		• 3 bases / triplet (code) / codon (1) • {Code for / determine / owtte} one amino acid (1) • {Sequence / order} of amino acids forms the {(PG) enzyme / protein} / amino acids are linked to form the {(PG) enzyme / protein} (1)	2	1		3		
	(b)	(i)		Concerns about health implications of (eating) GM foods / owtte / (Long term / unknown) side effects	1			1		
		(ii)		**Any two (x1) from:** • less wastage (1) • less money lost / more profit (for shops) (1) • longer shelf life / last longer (1) • more food available (1) • allows them to be transported for sale (1) Reference to taste neutral			2	2		
				Question 6 total	**4**	**1**	**2**	**7**	**0**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		10 000 = 2 marks **If incorrect award 1 mark for** 1.25/100 x 800 000		2		2	2	
		(ii)		{bacterium / Vibrio cholerae / it} is {no longer / not} {killed / destroyed} Reject reference to immunity / virus	1			1		
		(iii)		**Any four (x1) from** A. {Mutation / change in a gene} (occurs to give rise to resistant bacteria) (1) B. (These bacteria) had a (selective) advantage (1) C. (Resistant bacteria) survived (1) D. Non-resistant bacteria were killed (1) E. (Resistant bacteria) reproduce / multiply (1) F. to pass on {their genes / the mutation} (1)	2	2		4		
	(b)	(i)		**Any three (x1) from** Antigen (in vaccine) (1) • (stimulates) lymphocytes (1) • to produce antibodies (against the antigens) (1) • And memory cells (specific to *Vibrio cholerae)* (1) • which {produce antibodies faster / produce more antibodies} (in response to infection) (1) • Destroys {it / the bacteria / *Vibrio cholerae* / the antigen} {before symptoms occur / owtte} (1) Accept cholera for *Vibrio cholerae*	1	2		3		
		(ii)		{More / lots} memory cells (produced)			1	1		
				Question 7 total	**4**	**6**	**1**	**11**	**2**	**0**

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FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	7	0	0	7	0	0
2	5	0	0	5	0	0
3	2	2	0	4	0	0
4	0	2	2	4	0	0
5	0	6	0	6	0	0
6	1	6	5	12	6	12
7	3	2	2	7	0	2
8	4	5	0	9	2	0
9	2	1	3	6	1	6
TOTAL	**24**	**24**	**12**	**60**	**9**	**20**

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HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	5	0	9	2	0
2	2	1	3	6	1	6
3	1	5	1	7	4	6
4	4	3	1	8	0	2
5	5	3	4	12	1	0
6	4	1	2	7	0	0
7	4	6	1	11	2	0
TOTAL	**24**	**24**	**12**	**60**	**10**	**14**

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